

REPLY TO OFFICE ACTION
DATED APRIL 1, 2008

Appln. No. 10/716,819

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Amendments to the Claims

This listing of claims replaces all prior versions and listings of claims in the application.

Listing of Claims

1 (currently amended). A bender structure piezoelectric device having an additional laminate layer of a piezo-resistive material attached thereto ~~the function of which is for sensing and responding to the actual deflection of the bender device.~~

2 (currently amended). A piezoelectric device as claimed in claim 1, ~~wherein in operation~~ further comprising an associated control system applies adapted to apply a voltage to said additional laminate layer and to detects the a change in current therein and thus electrical resistance thereof, or applies to apply a current to said additional laminate layer and detects the a change in voltage thereof.

3 (currently amended). A piezoelectric device as claimed in claim 1, wherein said additional laminate layer is arranged to be the a layer of piezo-resistive material closest to the neutral axis of the bender, ~~generally near the centre of the bender layer stack.~~

4 (currently amended). A piezoelectric device as claimed in claim 1, ~~wherein there are two or more~~ further comprising a plurality of said additional laminate layers, disposed in such a manner as to minimise hysteresis effects therein ~~by arranging for some cancellation of the hysteresis effects between the layers when used in combination.~~

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5 (currently amended). A piezoelectric device as claimed in claim 4, wherein there is included a differential amplifier ~~used in operation~~ arranged to sense the difference of the output signals from ~~the two or more~~ said plurality of additional laminate layers and to provide a net signal therefrom ~~that more precisely indicates the actual deflection of the~~ bender.

Claim 6 (canceled).

7 (currently amended). A piezoelectric device as claimed in claim 1, wherein said piezoelectric device comprises ~~several~~ a plurality of layers of piezoelectric material bonded together into a laminate with said additional laminate layer also bonded into the laminate.

8 (currently amended). A piezoelectric device as claimed in claim 1, wherein, in order to achieve better linearity of the piezo-resistive ~~sensing layer~~ material around the a zero strain point of the bender, said additional laminate layer is bonded to the piezoelectric device, in ~~the~~ a post-sintering method of construction, the piezoelectric device is maximally deflected in the direction that ~~would normally apply~~ applies compressive strain to the piezoresistive layer, and the bender deflection maintained until the bonding process is complete.

9 (original). An acoustic transducer incorporating a piezoelectric device as claimed in claim 1, wherein the piezoelectric device is arranged to produce movement of air, and thus sound waves, in response to an input drive voltage.

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10 (new). A piezoelectric device as claimed in claim 1, further comprising two said additional laminate layers arranged such that on bending of the bender one said additional laminate layer experiences compression while the other said additional laminate layer experiences extension and vice-versa.

11 (new). A piezoelectric device as claimed in claim 10, further comprising a differential amplifier arranged to sense the difference of the output signals from said two additional laminate layers and to provide a net signal therefrom.

12 (new). A bender structure piezoelectric device comprising:
a first flexible layer;
a second flexible layer attached to said first layer, at least one of said first and second layers comprising a piezoelectric material; and
an additional laminate layer of a piezo-resistive material attached to one of said first and second layers.

13 (new). A piezoelectric device as claimed in Claim 12, further comprising an insulating layer positioned between said additional laminate layer of said piezo-resistive material and said one of said first and second layers.

14 (new). A method of making a piezoelectric device as claimed in claim 1, comprising:

bonding said additional laminate layer to the piezoelectric device;

deflecting said piezoelectric device maximally in the direction that applies compressive strain to the piezo-resistive material; and

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maintaining the piezoelectric device deflection until bonding is complete.